4/6/05 Meeting Notes – Landfill Stability Workgroup
Raptor Conference Room – South Central Region Headquarters
website: http://dnr.wi.gov/org/aw/wm/solid/landfill/stability/index.htm

Attending: Sherren Clark (BT^2), Bob Ham (UW-Madison), Gerard Hamblin (WMWI), Dan Leclaire (WMWI), Gene Mitchell (DNR), Aga Razvi (UW-Stevens Point), John Reindl (Dane County), Joe Van Rossum (UW-Extension/SHWEC), Brad Wolbert (DNR), Dave Benschawel (City of Madison)

I. General Items: Gene Mitchell reviewed the results of the March Natural Resources Board meeting. The Board passed the landfill rule that includes the provision for landfill owners to submit organics stabilization plans; this will now go to the Legislature for review. In addition, the Board:

- passed a resolution requiring the Department to develop a comprehensive materials use and disposal strategy, reporting back to the Board by March 2007, and
- directed the Department to return to the Board by February 2006 with a proposed follow-up rule providing further details for the stability plans as well as proposed financial responsibility changes.

The workgroup was also reminded that its meetings are considered public and are announced on the DNR web site in advance.

II. Definition and Measurement of Stability: The group spent the remainder of the meeting in an open discussion of how to define and measure organics stabilization, focusing on the "Presumptive/Confirmatory" model proposed at the previous meeting. Key issues discussed included:

- How are organics diversion and in-landfill organics reaction related in terms of achieving the stability goal?
  - In the proposed model, 75% of the total projected carbon should be generated and controlled, but what is the starting point – pre-diversion or post-diversion?
  - diverting organics might not change length of gas generation curve, it might just lower the peak. Our goal is to accelerate decomposition and hence gas production—to reduce the time it takes for the gas curve to fall below a certain level. Note, however, that if enough organics are diverted, so that there's little or no fuel in the system for generating methane, the peak is so low that stability is essentially achieved from the start regardless of the length of the lowered gas curve.
- Should diversion of easily degraded organics such as food waste be credited with accelerating stability? It is the more the paper that poses problems 30 or more years after closure, with wood believed to exhibit very little degradation (although there is evidence that food and yard waste do not always degrade as rapidly as this question suggests):

- Diverting only food waste might cause space to be filled up with slower-degrading organics, pushing the gas curve even farther out in time. Diversion probably needs to include paper too.
- Short of additional landfill bans, it's difficult for most landfill operators to unilaterally turn away paper or food – the diversion has to take place during collection, not at the landfill gate.
- With diversion, there is the need to ensure that the proper environmental controls are used at the place to which the organics are diverted.

- Considering the factors that promote faster in-landfill decomposition—readily available carbon, moisture, small particle size, and better mixing—one might argue that the landfill's effectiveness as a reactor would benefit from adding easily degraded organics, not diverting them. The counterargument is that we need to minimize the acid phase of decomposition and the initial slug of uncaptured gas generation by minimizing the easily degradable organics. Aerobic decomposition as a first step may be a solution to both concerns.

- The group reiterated its interest in a well-defined incentive for reaching stability, such as a reduction in long-term care costs, although it acknowledges that the reduction of long-term liability is an incentive that may be sufficient for some owners.

- Are transition impacts a concern? How will effects be measured if actions are initiated halfway through the life of a landfill? The rule would apply to plans of operation approved after 1/1/04, i.e., stability actions would generally be initiated at the start of a new contiguous or noncontiguous expansion. In some cases this might cause measurement difficulties, but for most sites it would not. Even for the sites with measurement uncertainties, the long-term liability would at least be reduced.

- Reminder: the proposed measurement model would differentiate between measures needed for *operational controls* (these are indicator-level measures) and a *request for closure* (these are assessment-level measures).

- Regarding operational controls: we have discussed already that we expect stability plans (and, possibly, the DNR's rule and associated guidelines) will inevitably be iterative in nature—operators will likely have to periodically modify their plans in order to reach stability. This could be accomplished through a series of 5-year progress reports, for example.

- The discussion of operational controls is oriented towards in-landfill methods. Measurement and standards are not as difficult with diversion and pre-processing. For example, pre-processing via composting prior to landfilling of residue leaves very little in the way of stability risk.

- Using the in-landfill reaction method, much of the organic loading might already be gone by the time a landfill is closed as well, due to addition of liquids. We know that gas production skyrockets when leachate is recirculated, before a cap is placed. The cumulative gas production from the start of filling could be used as a

surrogate for carbon loss, based on the initial carbon loading derived from the general composition of the waste.

- Experience at the City of Madison's closed landfill sites indicates that there is still fresh waste (green grass clippings are one example) evident 40-50 years after closure with a non-composite cap. Gas generation increased immediately when caps were pulled off during construction. The moisture appeared to have channelized through the waste, missing much of it. On the other hand, research at Fresh Kills showed chemically (through cellulose loss) that the waste is decomposing just fine, even though Rathje found undecomposed organics. What decomposed isn't visible, what has not decomposed is visible, but you can't conclude on that basis that decomposition is not occurring. There is often a direct relationship between decomposition and moisture content (with exceptions, such as acid-locked landfills)

- There are some data on preprocessing to show that shredding increases the rate of organics decomposition in the landfill. Madison Greentree landfill was largely shredded paper waste; when exhumed, it was found to be decomposing much faster than organics in other landfills. (The waste was shredded to reduce hauling costs—but note that generally waste trucks are now weight-limited already, so savings in hauling are no longer available to counterbalance the cost of processing.)

- Still not clear that 75% is achievable due to lack of sufficient available moisture, especially once the site is capped. This may require a change in the concept of landfill closure – creation of an interim status during which reaction is occurring and gas is being collected, but before it's possible to walk away.

- A sacrificial plastic cap might allow very high collection efficiencies during this time. Alternative caps let in about 1/3 of rainfall. A compost cap oxidizes methane, as shown by flux box testing. Collection efficiencies in the 80-90% range are achievable.

III. Content of Plans:

- All plans should include a section on baseline data collection for the facility, i.e., what will the 75% be measured from? Ideally, this would not be based on default waste composition numbers, but would be measured. Baseline data would include everything in the gas curve: moisture content, temperature, and carbon loading.

- Although an actual gas curve may not be necessary for comparison to the 75% and 1% standard, it is needed to determine if the plan has accelerated the achievement of stability.

- For plans, one approach would be to require submittal of an AP42 curve, a custom curve based on site-specific inputs, and an ongoing cumulative curve to assess progress. Solids sampling could provide a means of calibration for the general method, if not for each specific site.

- Data quality and precision issues would require the iterative process previously discussed. Our ability to estimate k and L_0 would improve along the way as we develop and work with the data. Multiple k values might be necessary depending on whether a cell is capped or not, the waste types, etc.

- Facilities that plan to exclude OCC and paper, food waste, etc. should still submit a gas curve. Need to further discuss how to credit such a facility for lowering the potential gas curve, and whether that facility would still need to eliminate 75% of the received carbon before qualifying for presumptive stability. If one views the landfill as a decomposable entity, that argues for requiring the 75% reduction.

- The shape that the plans take (e.g., the decision whether to rely on diversion, pretreatment or in-landfill reaction, or a combination) will likely be market-driven.

IV. Next Meeting: The next meeting will be Tuesday, May 3 at 1:00 pm in the DNR's SCR Raptor Conference Room, as previously scheduled. The following meeting is now scheduled for Tuesday, June 7 at 1:00 and will also be in the DNR's SCR Raptor Conference Room.

The focus of the next meeting will be the content of organics stability plans. Another potential topic is a discussion of the SWANA Stability Subcommittee position statement of December 17, 2004.